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Title: Vascular Structure and Functional Responses to Consecutive High-Fat Feeding between Insulin Treatment Regimens in Adults with Type 1 Diabetes and Matched Controls.

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Abstract: Background Impaired vascular health is prevalent in type 1 diabetes (T1D); however, it remains unknown whether different insulin treatment regimens mediate indices of vascular structure or function.

Methods Sixteen individuals with T1D receiving either multiple daily injection therapy (MDI; n=8; age: 32±13years; BMI:26.0±5.9kg.m²; HbA1c:53.7±11.2mmol/mol [7.1±3.2%]) or continuous subcutaneous insulin infusion (CSII; n=8; age:35±18years; BMI:26.3±4.6kg.m²; HbA1c: 58.6±9.7mmol/mol [7.5±3.0%]) and ten matched controls (CON; age:31±13years; BMI: 24.3±2.9kg.m²) consumed two high fat (HF) meals at 4-hour intervals. Carotid artery intima-media thickness (CIMT) and flow mediated dilation (FMD) was assessed at baseline, with further FMD assessment at 3-hrs following the ingestion of each meal using high resolution B-mode ultrasound. Bolus insulin dose was standardised using the carbohydrate-counting method. **Results** CIMT was significantly higher in individuals with T1D compared to controls (p=0.039); treatment stratification within T1D revealed MDI mediated this effect (MDI vs. CON: p=0.049; CSII vs. CON: p=0.112). FMD remained unchanged following the first meal (p=0.204) but was significantly impaired following the second meal (p<0.001); post-hoc analysis revealed MDI mediated this effect of impaired FMD after the second meal (MDI vs. CON: p=0.048; CSII vs. CON: p=0.416). **Conclusions** Our findings indicate that patients treated with MDI therapy have higher CIMT (a structural marker of subclinical atherosclerosis) compared to controls but not CSII therapy. FMD was impaired following a second HF meal irrespective of a diabetes status. Considering the pre-existing heightened cardiovascular disease risk in T1D therapeutic strategies to reduce postprandial risk warrants further research.